

WEST VIRGINIA

AGRICULTURAL EXPERIMENT STATION,

MORGANTOWN, W. VA.

BULLETIN 51.

JANUARY, 1898.

Commercial Fertilizers.

BY B. H. HITE.

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FAIRMONT:
INDEX STEAM PRINTING HOUSE.
1898

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COMMERCIAL FERTILIZERS.

During the year 1897, 44 manufacturing establishments registered for sale in this state, 184 brands as follows:

| | |
|---------------------------------------|----|
| Acid Phosphates | 46 |
| Ground Bones, etc | 17 |
| Acid Phosphates with Potash | 25 |
| Complete Fertilizers | 86 |
| Miscellaneous | 10 |

| | |
|-----------------|-----|
| Total | 184 |
|-----------------|-----|

The duties of the Experiment Station in regard to Commercial Fertilizers are set forth in "An Act Concerning Commercial Fertilizers," a copy of which may be found on the last pages of this bulletin. In accordance with this act, 303 samples have been analyzed this year, viz:

| | |
|--|-----|
| Samples submitted by manufacturers | |
| ("Official Samples") | 184 |
| Official Samples, rejected | 14 |
| Inspector's Samples | 100 |
| Samples submitted by farmers | 5 |

303

These analyses were all made in duplicate by the methods of the Association of Official Agricultural Chemists. The results of these analyses are given in

TABLE I,

which is a complete report of the analytical work on Commercial Fertilizers for the year ending December 31, 1897.

In this table the results of the analysis of the samples sub-

mitted by the manufacturers and the samples found on sale in the state by the inspector are arranged in parallel columns on either side of the figures guaranteed by the manufacturer. This arranges the columns of figures in groups of three columns each.

The first group of three columns is devoted to Total Phosphoric Acid; the second group of three columns to Available Phosphoric Acid; the third group to Nitrogen; the fourth to Potash; the fifth to Valuations.

The figures in the first column of each group (of 3 columns) are obtained from the analysis of the sample submitted by the manufacturer,—the "Official Samples." The figures in the second (middle) column of each group (excepting the fifth group, which is devoted to valuations) are obtained from the manufacturer's affidavit,—they constitute his "minimum guaranteed analysis."

The figures in the third column of each group are obtained from the analysis of the samples collected by the inspector. We trust this arrangement will be found convenient. It enables us to publish the work in less than half the space that would otherwise be required, while everything relating to the composition of a fertilizer is given in a single line, opposite the name of the brand and the name and address of the manufacturer.

In looking up the analysis of fertilizers, the names of the brands mean very little, except in connection with the names of manufacturers, so the latter names are arranged alphabetically.

It is certainly much more convenient, for all practical purposes, to place all the brands of one manufacturer near each other, than to attempt to classify them as "Acid Phosphates," "Complete Fertilizers," "Miscellaneous," etc.

These terms "Acid Phosphates," "Complete Fertilizer," etc., remind us of numerous requests from farmers (and a corresponding number of promises on our part) that we publish in our next fertilizer bulletin, some general information concerning the

COMPOSITION AND VALUATION OF COMMERCIAL FERTILIZERS.

Fertilizers may be divided, roughly, into two classes: direct or nutritive fertilizers and indirect or stimulant fertilizers. Fertilizers of the first class contain essential elements of plant food, and contribute directly to the building up of plant tissue. Quite a number of materials are used in the elaboration of plant tissues, and conspicuous among these are carbonic acid gas and water, from which often 90% of the entire plant is derived, but as these are always present, generally in the greatest abundance, we do not always have them in mind when speaking of plant food, but restrict this term to include about a dozen materials which plants obtain from the soil. Most of these, in turn, are present, even in the poorest soils, and in sufficient quantities for the heaviest crops, so that it is seldom necessary to add them to the soil. Three of these materials, however, nitrogen, potash, and phosphoric acid, are likely to become exhausted from the soils, by continuous heavy crops, so that it is some one or two, or all three of these ingredients that poor soils generally lack. If we include the nitrogen of the air,—which is always present, it must indeed be said that even these ingredients are always present in the greatest abundance for the very heaviest crops. It is the phosphoric acid, potash, and nitrogen, *in available form*, that is likely to become exhausted, and which must then be added to the soil, and so it is the “*available phosphoric acid*,” “*available potash*,” and “*available nitrogen*” that constitute the valuable ingredients of a fertilizer.

In order to meet the needs of crops and the deficiencies of soils on which crops are grown, fertilizers are prepared containing any one or two or all of these ingredients, so there are fertilizers containing:

Phosphoric acid alone (as in “Acid Phosphates”); Potash alone (as in “Kainit” and other potash compounds); Nitrogen alone (Ammonia compounds), Phosphoric acid and Potash (acid phosphates and potash, “Bone and Potash”); Phosphoric

acid and Nitrogen ("Ground Bones," "Dissolved Animal Bones"); Potash and Nitrogen (saltpetre); Phosphoric acid, Potash and Nitrogen ("guanos" and other "complete fertilizers").

THE PHOSPHORIC ACIDS.

Notwithstanding the fact that we have occasion so often to use the term "phosphoric acid" in describing fertilizers, there is really no free phosphoric acid in them. Free phosphoric acid is always readily "soluble" in water and never "reverts." Free phosphoric acid readily combines with lime to form a "phosphate of lime," or "calcium phosphate." It combines with lime in three proportions to form three different "phosphates of lime," or "calcium phosphates," as they are often called. The prefixes "mono" (one), "di" (two), and "tri" (three) are conveniently used in describing these compounds of phosphoric acid with lime.

Phosphoric acid combines with one part of lime to form "mono calcium phosphate," a compound that is soluble in water. The phosphoric acid ($P_2 O_5$) *combined in this way* (with one part of lime) is known as "soluble phosphoric acid."

The phosphate of lime containing *two* parts of lime and known as di calcium phosphate is not soluble in water. It is soluble in a solution of ammonium citrate, and for that reason the name "citrate soluble" is used. It is generally known as the "reverted" phosphate, and the phosphoric acid ($P_2 O_5$) which it contains is generally known as "reverted phosphoric acid."

The phosphate of lime containing three parts of lime and known as tri calcium phosphate is insoluble in water and ammonium citrate, and the phosphoric acid ($P_2 O_5$) combined in this way is called "insoluble phosphoric acid." Insoluble phosphate of lime is found in abundance in the phosphatic rocks of South Carolina, Florida, and Tennessee. It is also found in bones, bone black, bone ash, etc. It is from this insoluble phosphate that the soluble and reverted phosphates are made.

It is to be observed that the solubility of the three phos-

phates of lime, mentioned above, decreases as the quantity of lime (Ca O) in combination increases, the mono calcium phosphate being readily soluble in water, the di calcium phosphate being insoluble in water but soluble in ammonium citrate, while tri calcium phosphate is insoluble in either water or ammonium citrate.

The soluble and reverted phosphates taken together constitute the available phosphates. In order to convert the insoluble phosphate into one of the available forms, it is only necessary to remove one or two of the three parts of the lime in combination. This is done by treating the insoluble phosphate, in the form of phosphate rock, ground bone, bone ash, etc., with sulphuric acid (oil of vitriol) which takes possession of one or two parts of the lime (depending upon the quantity of vitriol used) to form sulphate of lime (gypsum, land plaster), leaving di calcium or mono calcium phosphate, either of which is available. A portion of the mono calcium or soluble phosphate prepared in this way may take up another part of lime to form the di calcium phosphate and so "pass back" ("revert") to a less soluble form. This accounts for the names "reverted phosphate of lime" and "reverted phosphoric acid."

We trust this brief and imperfect explanation will serve to give a general idea of these transformations. One or two points should be noted.

(1) The starting point in the manufacture of available phosphates is the insoluble phosphate. In order to render this available, a part of the lime in combination must be removed, and this cannot be done except by chemical agencies.

(2) The sulphuric acid (vitriol) used for this purpose, is an "acid,"—a "chemical." It is indeed one of the most "violent chemicals" but the gypsum, land plaster, formed when the acid combines with the lime, is a perfectly neutral substance, which is often used as a fertilizer. Fertilizer manufacturers make no special claim for the gypsum, and seem to attach no special value to it. Many of them would, doubtless, remove the gypsum in order to cut down the bulk of the fertilizer, if there was any practical method of doing this. We mention this matter

in order to allay the anxiety that has been aroused in some sections by the oracles (on *all* agricultural subjects) who in catering to a prejudice (for which they are largely responsible) find this subject of "chemicals" and "chemical manures" a very valuable bit of stock in trade, but who generally forget to state that the "strong acid" which is to play such havoc in the soil on which it is used, has been converted into gypsum, land plaster, the very material which they often recommend to correct these disastrous effects.

Available phosphates may be prepared by treating the rock phosphate with phosphoric acid (instead of sulphuric acid) in which case, of course, no gypsum will be formed, but in its stead there will be formed a corresponding amount of available phosphates. Evidently very highly concentrated fertilizers may be prepared in this way. They are the true "super-phosphates," but this term is often used in describing ordinary phosphates. The advantages for these goods are a more concentrated product and a consequent saving in freight. The available phosphates contained in them are the same as in the ordinary phosphate.

THOMAS SLAG.

We have spoken of three phosphates of lime,—the mono, di and tri calcium phosphates. There is another phosphate coming into the market and known as Thomas Slag, or "odorless phosphate." In this material we have to deal with a *tetra* calcium phosphate or "tetra basic phosphate," as it is sometimes called. It is formed as a by-product in the manufacture of iron and steel, from certain kinds of ore containing phosphorous compounds. When ground to a fine powder it is insoluble in water, but soluble to some extent in ammonium citrate solutions. We have had very little to do with it at this station. Reports from those who have used it show that the practical results "have been varied, often being most excellent and again very indifferent."

We are often asked: "What other materials does a phosphate contain besides the phosphoric acid recorded in the

table?" Or, as the question is generally put: "I see this phosphate contains 16% of phosphoric acid; now what is the other 84%?" The phosphate rock does not consist entirely of calcium phosphate. There are other materials, such as sand, clay, lime, moisture, and organic matter. These often amount to 30%. This would leave 70% for calcium phosphate, and only about 45.8% of this amount is phosphoric acid (P_2O_5); the rest is lime (CaO). So this rock would contain but 45.8% of 70%, or about 32% of phosphoric acid. In order to get this into available form, the ground rock must be treated with about an equal weight of sulphuric acid, and this, of course, divides the per cent of phosphoric acid by 2. We are not manufacturers, and do not offer the above as absolutely accurate; but simply to show (what is undoubtedly true) that "the other 84%" may be easily accounted for.

POTASH.

The common sources of potash in commercial fertilizers are the following:

Canallite which contains 13% to 14% actual potash (K_2O); Kainit (12 to 14%); Krugite (8 to 9%); Sulphate of Potash (48 to 51%) Sulphate of Potash and Magnesia (26 to 28%); Nitrate of Potash (44 to 46%); Wood ashes (3 to 7%); Tobacco stems (6 to 7%).

Most of these materials are obtained from the great potash mines of Germany. All such potash salts are soluble in water, so they do not need to be treated in any way to render them available. Potash compounds that are not soluble in water are disregarded in estimating the value of a fertilizer.

NITROGEN.

Nitrogen is more expensive than phosphoric acid and potash combined. This is not so much because nitrogen is so scarce (although it is one of the rarer elements) for it constitutes nearly four-fifths of the air. Plants live in it, but as a rule they cannot obtain from this source even the relatively small amount they require. This appears the more strange in view of the

fact that plants requiring a hundred times as much carbon (as nitrogen) have no trouble whatever in obtaining this from the four parts of carbonic acid gas in ten thousand parts of air. But it is a condition which confronts us; plants as a rule cannot obtain their nitrogen from the air, and it is not until the nitrogen has been oxidized by combustion, electrical discharges, or the action of certain micro-organisms that it assumes an agricultural value.

Nitrogen combines with oxygen to form an oxide of nitrogen which combines with water to form nitric acid (aqua fortis) and this, in turn, combines with soda to form nitrate of soda (Chile saltpetre), one of the most important sources of nitrogen in fertilizers.

Fourteen parts (by weight) of nitrogen combine with three parts of hydrogen to form ammonia (hartshorn), so 1.00% of ammonia is equal to 0.82% of nitrogen. Ammonia combines with sulphuric acid (oil of vitriol, the overworked goblin of the anti-"chemical" brethren) to form sulphate of ammonium, a most excellent source of nitrogen for manurial purposes.

Other sources of nitrogen in commercial fertilizers are cotton seed meal, castor bean pomace, tobacco postems, fish scrap, dried blood, ground bone, wool waste, horns, hoofs, and animal refuse generally.

It is believed that all nitrogenous materials applied to the soil must be broken down and the nitrogen fully oxidized to "nitric" nitrogen (the form in which it exists in nitric acid and its compounds), before it can be used by plants. This transformation is known as "nitrification" and is effected by means of certain micro-organisms. There are some plants, notably those of the leguminous family (clovers, etc.) which permit the development, on their rootlets, of colonies of bacteria, which have the power to render atmospheric nitrogen available for plant growth. In such cases there is no reason for believing that the host plant has any further part in these transformations than to afford a suitable place for the growth of the bacteria.

It is to be observed that none of these nitrifying organisms

can live on nitrogen alone. They are plants (of a low order), and require other constituents of plant food, notably phosphoric acid. It is interesting to note the time required to dislodge a prejudice as unreasonable as that which condemns the so-called "chemical" manures, and the readiness with which any theory which promises something for nothing will be accepted. No sooner did something in regard to the action of these nitrifying organisms begin to be generally known, than there were those who seemed to think that a field could be farmed until nothing but taxes would grow on it, and then put in good shape by simply sowing a little clover seed on it, and leaving the bacteria to do the rest.

The value of these nitrifying organisms to agriculture, no one can estimate. The possibilities to be revealed as investigations along these lines proceed, may be greater than even the most sanguine, at present, would venture to predict, but there is little to indicate that anything but disappointments need be expected from any "nitrogen for nothing" hypotheses. The bacteria that will furnish available nitrogen gratis and board themselves have yet to be discovered.

FARM MANURE.

Another source of phosphoric acid, potash, and nitrogen (not in commercial fertilizers to be sure) is farm manure, barnyard manure, and as it is with this material that "chemical manures" are generally compared, a few words in regard to it may not be out of place in this connection. No one else at the Station is to be held in any way responsible for the little we shall say, and it should be remembered that we are not the agriculturist, and so do not speak as one having authority in such matters.

Farm manure has a value. It is one of the most important by-products of the farm. To waste it should be a sort of extravagance that no system of farm economy could stand. It is well worthy of a great deal more care and attention than it generally receives. It is just so much money saved, and may often be made a very respectable item in the profits of the farm.

Every one knows that farm manure is all this and perhaps a great deal more, and fortunate for us all, this is true, but let us mention briefly what farm manure is *not*.

It is not a well balanced fertilizer. It contains a small amount of all the essential elements of plant food, but not in the proportions ordinarily required, so it cannot always be used economically, at least by itself.

The essential elements which it does contain are not as valuable, pound for pound, as those in a well made commercial fertilizer, because they are not in as readily available form. We are fully aware that this statement is never allowed to go unchallenged by some who insist upon the possibilities of all sorts of reactions for such a complex mixture, and so attribute to the farm manure, a value that is simply out of all proportion to the plant food it actually contains. In the absence of any evidence supporting such claims, however, it might be just as well to remember that the chemical analysis says they are not as readily available, and there is nothing in the treatment to which the constituents of the manure have been subjected, that would indicate that the analysis is not in accordance with the facts. There is always more or less mystery connected with the operations that take place in an animal body, but this is not the case with a finished product. Subsequent fermentation and decomposition, in a *properly managed* manure pile, do greatly increase the availability, but these transformations are largely a matter of conditions, the ideals of which are seldom, if ever, realized.

The above is about as much as can be said on the subject of farm manure without referring to

HUMUS.

Humus is one (or rather a number) of the many products of the decomposition of organic matter in the soil. It has a mechanical action on the soil, similar to that of lime, in that it will break up as a soil that is too compact and tighten one that is too loose. It also has the power of preventing the loss of some of the readily soluble forms of plant food, by combining

with them to form compounds that are insoluble; and has associated with it the more important elements of plant food. Indeed such a variety of valuable points can hardly be claimed for any other fertilizer, and it seems almost unkind to add that agricultural plants (excepting mushrooms) can grow perfectly well without any humus. But humus is undoubtedly a valuable addition to the soil.

Farm manure contains more or less humus, and for this it should, and generally does, receive full credit. But farm manure is not the only source of humus. The roots, leaves, stubble, etc. of each crop contribute to the supply, which may be increased to almost any desired amount, and at the same time, a liberal supply of nitrogen may be provided by turning under a *well-fed* crop of clover or other leguminous plants.

We do not wish to discourage farmers in using the manure which their farms produce. As we have said, we believe it is well worthy of a great deal more attention than it ordinarily receives, and even if we are right in the above (which it is needless to say is in no sense original with us) and if farmers have been paying fancy prices for farm manure, this in no way decreases its undoubted value.

If we are wrong, the voluminous articles on this subject that have appeared in agricultural papers, since "the time whereof the memory of man runneth not to the contrary," may certainly be relied upon to furnish a sufficient antidote.

STIMULANT FERTILIZERS.

The principal indirect or stimulant fertilizers are land plaster and lime. These materials do not contain, and so do not furnish directly, to the soil, any constituents of plant food that are not likely to be present in abundance. Their chief value depends upon their power to change unavailable forms of plant food already in the soil, into available forms.

Land plaster (known also as gypsum, calcium sulphate, sulphate of lime) has long been used as a fertilizer and probably acts in a number of ways, the most important of which is that of converting insoluble compounds of potash into available

form. Moist gypsum may be used to prevent loss of ammonia from decomposing nitrogenous matter in stable manure, etc. It also favors, in some way, the nitrification processes already referred to.

Gypsum, it will be remembered, is a compound of lime and sulphuric acid, and its value depends as much upon the acid portion of the compound as upon the lime. It is the sulphate of potash that goes into solution when gypsum acts upon the soil, and it is the sulphate of ammonia that is formed when gypsum prevents the loss of this material.

Lime (quick lime, calcium oxide) as every one knows is made by burning limestone (carbonate of lime). In this operation the carbonic acid gas is driven off, leaving "burnt lime" or calcium oxide. When this is applied to the soil, it soon takes up carbonic acid gas and passes back to the carbonate of lime, but it is then in a much more finely divided condition than it existed in the limestone.

Lime improves the mechanical condition of soils, by loosening heavy clay soil and compacting loose sandy soil. By its chemical action, insoluble mineral substances containing potash are converted into available form; it also aids in the decomposition of animal and vegetable matter. It may be used to correct the abnormal acidity of "sour lands" notably sour meadow lands, and its effect is often readily perceptible in the disappearance of certain objectionable plants that had previously threatened to thrive to the extermination of everything else.

"Stimulant fertilizers" (like all other stimulants) have their uses, but may be used to excess. It should be remembered that they add no constituent of plant food that the soil is likely to need. Their principal value lies in their power to draw on the plant food already in the soil. They should not be used frequently or in large quantities, and should always be accompanied by a liberal supply of actual plant food.

HOME MIXING.

After looking over the array of plant food stuffs regularly on sale in the state, as shown in the tables, one would hardly sup-

pose that it would be necessary to prepare many special mixtures at the farm, and yet we are continually being asked for our opinion on this subject. The proposition to "buy the materials and compound the fertilizer with special reference to the needs of the soil and crops." is simply ideal, and we would like to be among the last to discourage any method toward which scientific agriculture may be tending, but the question, as it appears to us, is whether this can be accomplished any better or cheaper at the farm, working in a small way with little or no equipment, than at a factory with every facility for carrying out every part of the work.

The preparation of *small quantities* of special mixtures for *experimental* purposes, only, is of course another matter altogether, and cannot be too highly recommended. It would certainly be a most fascinating and instructive line of work, and if carefully carried out, would lead to results of greatest value in selecting fertilizers. If anyone working in this way should discover a new and valuable prescription for a fertilizer, we are confident that he would have no trouble in finding dozens of manufacturers who would be only too glad to put up the goods for him in any quantity, much more satisfactorily and probably for less money than he could make it himself.

VALUATIONS.

It is easy enough to analyze the goods. It is not so easy to fix a price based on the analysis that will cover not only the original cost of the raw material, but also the cost of grinding, mixing, bagging, wear and tear of machinery, etc., a fair profit for the manufacturers, freight to an average shipping point, and a fair commission to agents.

We are continually hearing from representatives of all parties concerned in the matter from the manufacturers to the farmers. There are manufacturers who tell us that they would be only too glad to deliver at our valuations, any quantity of any class of goods to any reasonable shipping point in the state; while others insist that they could not put some of their goods (notably their high grade mixed goods) on the cars at our

figures, and that whenever they find it necessary to accept such prices, they will get out of the business.

It is to be expected that some manufacturers will insist that our figures fall far short of the true values. We have never "guaranteed" our figures, except as "relative values," but it would appear from the above that they are probably nearer the *actual* values (whatever these may be) than they would have been if the matter had been left to some of the manufacturers.

Our figures are based on the analysis of the goods and the following

PRICES OF MATERIALS

IN ACID PHOSPHATES,

| | | | |
|-------------------------------|----|------|---------|
| Available Phosphoric Acid.... | 3½ | cts. | per lb. |
| Insoluble " " " " " " " " | 2 | " | " " " |

IN MIXED GOODS,

| | | | |
|-------------------------------|----|------|---------|
| Available Phosphoric Acid.... | 3½ | cts. | per lb. |
| Insoluble " " " " " " " " | 2 | " | " " " |
| Nitrogen..... | 21 | " | " " " |
| Potash (K_2O)..... | 6 | " | " " " |

IN BONES,

| | | | |
|-----------------------------|----|---|-------|
| Total Phosphoric Acid | 5 | " | " " " |
| Nitrogen.... | 15 | " | " " " |

The figures are supposed to cover the cost of the raw materials, cost of grinding, mixing, bagging, etc., and the manufacturer's profit. In other words, they are the figures at which we think manufacturers should be able to put their goods in the cars.

To this price we add \$2.50 per ton for freight. This gives approximately the cost to agents; and 20% of this amount is added to cover agent's commission.

Example (first brand in Table 1):

Suppose the fertilizer is an acid phosphate containing 12.51% available phosphoric acid, and 1.53% insoluble phosphoric acid.

The analysis shows that in one hundred pounds of goods there are 12.51 pounds of available phosphoric acid, and 1.53 pounds of insoluble phosphoric acid. In 1,000 pounds there would be 125.1 pounds of available and 15.3 of insoluble, and in 2,000 pounds, or one ton, there would be 250.2 pounds of available and 30.6 pounds of insoluble phosphoric acid.

| | |
|---|----------|
| 250.2 lbs. at $3\frac{1}{2}$ cts. per lb..... | \$8.757 |
| 30.6 " " 2 " " " | .612 |
| <hr/> | |
| Wholesale price | \$9.369 |
| Freight | 2.500 |
| <hr/> | |
| Cost to agents..... | \$11.869 |
| 20% for agent's commission | 2.374 |
| <hr/> | |
| Valuation | \$14.243 |

Or in round numbers. \$14.25, the valuation as found in the table.

We publish our method of estimating valuations so that in case farmers are better informed than we as to the price of ingredients, cost of grinding mixing, bagging, etc., fair profit to the manufacturers, freight to their particular shipping point, or a fair commission to agents, they can correct our figures accordingly.

As "relative valuations," our figures are, of course, correct; all being calculated on the same basis. As absolute values they are, we believe, fair, average, "live and let live" prices. We give them for what they are worth. No one is under any obligations to be governed by them.

If we were to judge of the prices of materials adopted in neighboring states, we would be inclined to think our figure for available phosphoric acid is too low and our nitrogen (in mixed goods) figure too high; and yet we are confident that acid phosphates are sold below our valuations more frequently than above them, while our valuations on mixed goods containing nitrogen have caused more complaints from manufacturers

and dealers than the valuations of all other classes of goods put together.

Farmers should remember that the valuations given on the tags are *not* wholesale prices. They are the prices at which farmers should be able to buy the goods from the agents. They are *liberal* retail prices.

The fertilizer laws of many states do not require a valuation to be placed on the goods, and those connected with the fertilizer control in those states claim that, in the absence of a valuation, purchasers pay more attention to the analysis of the goods, which of course is the matter of greatest importance. This may be true to some extent, but we cannot understand why anyone disposed to give the analysis the attention necessary to select fertilizers intelligently, need be prevented from doing so by a valuation calculated on a known basis, and after all, no figures that we could put on a tag would be less likely to be misunderstood than those with a \$ in front of them.

"GUARANTEED ANALYSES"

do not appear on the tags, and only the minimum figures appear in the tables. Manufacturers, as a rule, give more than one figure, e. g., "Potash 1% to 2%," but they are in no way responsible for the higher figure which is supposed to be given because the manufacturer, after stating how low his goods may run, thinks it only fair to state how high they may run, the difference between the two figures being the margin within which the goods may vary. This is the reason that is always understood, but it will hardly hold in those cases where the difference between the two figures far exceeds the limits of variations in composition that could reasonably be expected in goods making any pretensions to being well mixed, e. g., "Potash 1 to 2%" where the margin for variations is equal to the total amount of Potash that may be found in the goods.

Another stereotyped guarantee is "Available 10% to 12%," in which the margin for variations in composition is equal to 20% of the total amount that may be found in the goods. Would fertilizer manufacturers be willing to admit that they cannot

mix goods more accurately than that? What a beautiful fuss we would have on our hands if we should insist that such is the case.

We mention this subject of "Guaranteed Analyses" because manufacturers occasionally inform us that they sell their goods "on their own guaranteed analysis, *not* on *our* analysis." This implies that some one must *buy* them on these guaranteed analyses, and we simply want to call attention to the fact that these analyses, as generally stated, leave a very respectable margin for uncertainty.

INSPECTION.

A glance at Table 1 will show that with very few exceptions, the samples submitted by the manufacturers were up to the minimum guarantee. This table also shows that most of these "Official Samples" represented fairly well, the goods found on sale in the state,—as well perhaps, as should be expected, for it is not always an easy matter to get an accurate sample of a large quantity of material, and yet the table shows that this *can* be done. We shall continue to insist that goods found on sale in the state should not fall below the official sample more than \$1.00. About three-fourths of the samples found on sale this year are within this limit. The rest should have run higher. The fact that about an equal number of samples ran more than a dollar above the official samples, makes it appear highly probable that these variations are due to carelessness in drawing the official samples, and this is, we believe, the cause of these variations. But carelessness in such cases is simply inexcusable, and this is the most charitable explanation we feel disposed to offer for these variations—*inexcusable* carelessness.

The law evidently intends that these official samples shall represent the goods, and those who framed the law did well to introduce this feature, for by no other method known to us is the purchaser always provided with an accurate analysis of the goods.

We regret that we could not find a sample of every brand on sale in the state, but this seems to be almost impossible. The

goods come into the State during a very short period of the spring and fall. Many of them are engaged long before they are shipped, the farmers hauling them direct from the cars, so that it would be necessary to have a large number of inspectors in the field during these busy seasons. This our resources will not permit. We send a man over the state two or three times every year, but he can't be at every shipping point at the same time, though he does the best he can.

This inspection work is one of the most expensive features of our fertilizer law, and the expenses must be paid from the fees charged for the analysis of official samples. That is the reason we cannot analyze, gratis, samples of fertilizers that have not been registered in the state,—there being no available funds for this purpose.

This year as usual, the inspector has made several tours of the state, taking a sample of every brand that could be found. Many of these were duplicates, and samples of many registered brands could not be found. The value of this inspection work is, of course, to be estimated very much in the same way as that of a standing army, largely by what it could do, and it is not *absolutely necessary* that we find samples of every brand, every year, so long as no one knows when or where we may be taking samples. Yet is it *desirable* for many reasons that we secure each year, three or four samples of every brand. The object of the law is to enable purchasers of commercial fertilizers to avoid being swindled. This, we are confident, it is accomplishing. If it fails in any case, the swindled party has no one to blame but himself. The existence of the law implies that there may be some one who is inclined to do an unfair business, and it is only just to those engaged in the fertilizer business that they be able to show whether they are doing all they agree to do. We hear from farmers unpleasantly sometimes, because we could not find a sample of the goods they had been using, and we hear from the manufacturers of those goods in the same strain, because, not finding the samples, we had not shown whether his goods were what he had "agreed they should be and what he was confident they actually were."

The remedy for this is clearly stated in our fertilizer law about 30,000 copies of which have been scattered over the state every year, since the law went into effect, and another copy of which appears on the last pages of this bulletin. Section 8 provides that: "Any agriculturist, a purchaser of a commercial fertilizer in this state, may take a sample of the same under the rules and regulations of the said Experiment Station, and forward the same to the Experiment Station for analysis," etc. We have always advised farmers to send us samples of the goods they were using, but the trouble with the majority of those who were inclined to take advantage of this provision of the law, has always been that they would not follow instructions in drawing the sample. We have received many a letter like this: "You will find enclosed a sample of fertilizer, which please analyze and send us analysis by returned mail." Of course these are extreme cases, but we receive a large number of samples every year that are almost as carelessly drawn, and the analysis of which would be absolutely worthless—worse than worthless to the party sending them or to any one else.

Now it is just about as easy to take a sample that will be of some value as it is to take one that is not, and it costs just as much to analyze the one as the other. We consider it very desirable for purchasers of commercial fertilizers to submit samples of the goods they are using, and we will gladly do our part of the work, but those who send the samples must do their part.

We enclose with this bulletin, printed instructions for taking samples, and a blank form which will enable parties desiring to submit samples in accordance with the law, to make every necessary statement in about a dozen words and figures. We have tried to make these instructions clear and complete. Of course, a fair sample could be secured by other methods, but we know of no better method for the purpose than the one given, and it is desirable that all samples be taken in the same way.

We hope, during the coming year, to secure at least half a dozen samples of every brand on sale in the state.

VIOLATIONS OF THE FERTILIZER LAW.

Year after year the manufacturing establishments whose names are so familiar to the farmers of this state have been complying with our fertilizer law. Most of them, we believe, have been making a reasonable effort to carry out not only the letter but also the spirit of the law, and to their credit it could be said, have seemed to court rather than to try to avoid the rigid examination of their goods which the law requires. It occasionally happens, however, that a manufacturer (for reasons that the people, through their representatives doubtless had in mind when the law was framed) decides that he does not care to have his goods subjected to such an examination, and so tries to devise some scheme to dodge the law. One would think that any effort to dodge such an examination would be sufficient of itself to arouse suspicion, and it seems that this is true in this state.

The American Fertilizer Co., of Washington, D. C., has been endeavoring to induce the farmers of this state to buy their "Natural Plant Food" without having it examined at the Station. They have spent many times the ten dollars that would have been required to register the goods in trying to convince the farmers that such registration is unnecessary. Posters and truly excellent letters for the purpose have been scattered all over the state, but be it said to the credit of the farmers of this state, that we have not been able to find a single sack of the goods, though we have hunted all over the state for it. West Virginia seems to be lacking in the class of farmers who can be duped in this way, and in this connection it is interesting to note that this company tries to make great capital of the statement (certainly not of the fact) that their goods contain "no chemicals." Indeed they have worked this old prejudice for all it is worth, but it seems that the farmers of this state know (whether these manufacturers do or not) that plant food consists entirely of "chemicals," and that a supposed plant food, whether "natural" or of any other sort that contains "no chemicals" must be pretty light diet.

This company claims to enjoy immunity from the operations of the statutes of West Virginia concerning commercial fertilizers by virtue of certain interstate commerce regulations. This position is simply untenable, and those who may be induced to act as dealers or agents, for this or any other unregistered brand of fertilizer, will lay themselves liable to prosecutions according to the provisions of the aforesaid Act.

TABLE I.

Showing the Manufacturers' Guaranteed Analyses, the Analyses of Official Samples and the Analyses of the Inspector's Samples for 1897.

| NAME AND ADDRESS OF MANUFACTURER. | NAME OF BRAND. | | | | | | | | | | | | | | |
|---------------------------------------|---|-----------------------------------|--|---|--|---------------------------------------|------------------------------|----------------------|---------------------------------|----------------------------|--------------------|---------------------------------|----------------------------------|----------------------------------|-------------------------------------|
| | Total Phosphoric Acid in Official Sample. | Total Phosphoric Acid Guaranteed. | Total Phosphoric Acid in Inspector's Sample. | Available Phosphoric Acid in Official Sample. | Available Phosphoric Acid in Inspector's Sample. | Available Phosphoric Acid Guaranteed. | Nitrogen in Official Sample. | Nitrogen Guaranteed. | Nitrogen in Inspector's Sample. | Potash in Official Sample. | Potash Guaranteed. | Valuation of Official Analysis. | Valuation of Inspector's Sample. | Official Sample Above Guarantee. | Inspector's Sample Above Guarantee. |
| Allison & Addison, Richmond, Va. | 14.01 | 13.00 | 15.06 | 12.51 | 12.00 | 13.58 | 2.50 | 2.26 | 2.01 | 2.00 | 14.25 | 13.50 | 15.25 | 75 | 72 |
| Allison & Addison, Richmond, Va. | 12.50 | 9.50 | ..... | 9.65 | 8.50 | ..... | 1.15 | .82 | 2.38 | 2.00 | ..... | 28.00 | 25.00 | ..... | ..... |
| Allison & Addison, Richmond, Va. | 9.30 | 8.00 | ..... | 8.65 | 8.00 | ..... | 8.16 | 1.05 | .82 | 2.44 | 2.00 | 19.75 | 16.75 | 3.00 | ..... |
| Allison & Addison, Richmond, Va. | 10.39 | 9.00 | 9.77 | 8.61 | 8.00 | 8.36 | 1.94 | 1.65 | 1.38 | 1.54 | 1.00 | 2.61 | 20.00 | 17.25 | 2.75 |
| Allison & Addison, Richmond, Va. | 10.91 | 9.00 | 11.60 | 9.07 | 8.00 | 8.36 | 1.94 | 1.65 | 1.38 | 1.54 | 1.00 | 1.05 | 23.50 | 20.00 | 3.50 |
| Armour Fer. Works, Chicago, Ill. | 12.81 | 8.00 | ..... | 8.52 | 6.00 | ..... | 3.55 | 2.47 | 2.50 | 2.00 | ..... | 33.75 | 24.25 | 9.50 | ..... |
| Armour Fer. Works, Chicago, Ill. | 21.14 | 18.00 | ..... | 11.84 | 11.00 | ..... | 2.81 | 1.64 | ..... | ..... | ..... | 31.75 | 24.00 | 7.50 | ..... |
| Armour Fer. Works, Chicago, Ill. | 17.28 | 12.00 | ..... | 14.58 | 12.00 | ..... | 3.46 | 2.47 | 3.57 | ..... | ..... | 16.50 | 13.00 | 3.50 | ..... |
| Armour Fer. Works, Chicago, Ill. | 21.84 | 24.00 | 25.28 | ..... | ..... | ..... | 3.46 | 2.47 | 3.57 | ..... | ..... | 30.25 | 23.25 | 4.00 | 4.75 |
| Armour Fer. Works, Chicago, Ill. | 10.15 | 10.00 | ..... | 9.51 | 8.00 | ..... | 1.89 | 2.00 | 1.98 | 1.64 | ..... | 23.75 | 22.00 | 1.75 | ..... |
| Ammoniated Bone with Potash | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Accidulated Bone. | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Acid Phosphate. | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Bone Meal. | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Grain Grower. | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Atlantic & Va. Fer. Co. Richmond, Va. | 16.33 | 13.00 | ..... | 16.13 | 13.00 | ..... | ..... | ..... | ..... | ..... | ..... | 16.75 | 14.00 | 2.75 | ..... |
| Atlantic & Va. Fer. Co. Richmond, Va. | 16.93 | 10.00 | ..... | 13.53 | 10.00 | ..... | ..... | ..... | ..... | ..... | ..... | 16.00 | 11.50 | 4.50 | ..... |
| Atlantic & Va. Fer. Co. Richmond, Va. | 10.23 | 8.00 | ..... | 8.69 | 8.00 | ..... | 1.93 | 2.00 | 3.11 | 2.00 | ..... | 25.25 | 22.75 | 2.50 | ..... |
| Atlantic & Va. Fer. Co. Richmond, Va. | 14.89 | 10.00 | ..... | 13.14 | 10.00 | ..... | ..... | ..... | 1.96 | 2.00 | ..... | 17.75 | 14.25 | 3.50 | ..... |
| Baltimore Guano Co., Baltimore, Md. | 10.71 | 10.00 | 10.13 | 9.15 | 8.00 | 8.78 | 1.69 | 1.24 | 1.56 | 2.84 | 2.00 | 24.00 | 19.75 | 22.75 | 1.25 |
| Baltimore Guano Co., Baltimore, Md. | 15.87 | 13.00 | ..... | 13.26 | 11.00 | ..... | ..... | ..... | 3 | 2.50 | 2.00 | 20.00 | 16.00 | 4.00 | ..... |
| Baltimore Guano Co., Baltimore, Md. | 17.30 | 15.00 | 14.35 | 15.80 | 13.00 | 13.28 | ..... | ..... | ..... | ..... | ..... | 17.00 | 15.00 | 2.00 | ..... |
| Baltimore Guano Co., Baltimore, Md. | 12.25 | 11.00 | ..... | 10.71 | 9.00 | ..... | 2.46 | 2.06 | 2.99 | 2.50 | ..... | 29.25 | 25.50 | 3.75 | ..... |

TABLE I.—Continued.

| NAME AND ADDRESS OF MANUFACTURER. | NAME OF BRAND. | ANALYSIS. | | | | | | | | | | | |
|--|----------------|---|-----------------------------------|------------------------------------|------------------------------------|--|--------------------------------------|---|------------------------------|----------------------|---------------------------------|----------------------------|--------------------|
| | | Total Phosphoric Acid in Official Sample. | Total Phosphoric Acid Guaranteed. | Total Phosphate Acid in Insoluble. | Total Phosphate Acid in Insoluble. | Available Phosphate Acid in Official Sample. | Available Phosphate Acid Guaranteed. | Available Phosphate Acid in Inspector's Sample. | Nitrogen in Official Sample. | Nitrogen Guaranteed. | Nitrogen in Inspector's Sample. | Potash in Official Sample. | Potash Guaranteed. |
| Baltimore Pulverizing Co. Baltimore. | | 15.74 | 14.00 | 39.45 | 14.67 | 14.00 | 11.97 | 1.92 | 1.05 | 2.30 | 2.00 | 15.75 | 14.75 |
| Bartlett, Geo. S., Cincinnati, O. | | 14.49 | 11.00 | 10.56 | 8.00 | 8.00 | 8.00 | 2.14 | 1.65 | 2.00 | 2.00 | 26.75 | 22.25 |
| Baugh & Sons Co., Baltimore, Md. | | 12.05 | 8.00 | 8.25 | 8.00 | 8.00 | 9.61 | 2.45 | 2.06 | 2.00 | 2.00 | 26.50 | 20.75 |
| Baugh & Sons Co., Baltimore, Md. | | 11.90 | 8.00 | 12.72 | 9.39 | 8.00 | 9.61 | 2.45 | 2.06 | 2.00 | 2.00 | 26.00 | 20.75 |
| Baugh & Sons Co., Baltimore, Md. | | 16.29 | 11.00 | 15.38 | 14.96 | 14.00 | 14.71 | 1.39 | 1.82 | 1.33 | 1.24 | 16.25 | 14.75 |
| Baugh & Sons Co., Baltimore, Md. | | 11.03 | 8.00 | 11.10 | 9.80 | 8.00 | 8.99 | 4.28 | 3.29 | 4.30 | 1.56 | 20.50 | 15.25 |
| Baugh & Sons Co., Baltimore, Md. | | 22.19 | 21.50 | 22.98 | 14.68 | 11.00 | 11.00 | 3.14 | 2.47 | 1.00 | 1.00 | 31.75 | 27.75 |
| Baugh & Sons Co., Baltimore, Md. | | 18.56 | 11.00 | 14.68 | 11.00 | 11.00 | 11.00 | 1.38 | 1.25 | 1.48 | 1.00 | 33.00 | 24.75 |
| Blocher, D. & Co., Baltimore, Md. | | 16.80 | 15.00 | 16.40 | 14.00 | 10.23 | 8.00 | 1.36 | 1.00 | 1.36 | 1.00 | 17.00 | 15.25 |
| Blocher, D. & Co., Baltimore, Md. | | 12.76 | 10.00 | 10.23 | 8.00 | 8.00 | 8.00 | 1.97 | 1.00 | 1.97 | 1.00 | 17.25 | 13.75 |
| Blocher, D. & Co., Baltimore, Md. | | 13.07 | 9.00 | 12.48 | 7.00 | 7.00 | 7.00 | 1.97 | 1.00 | 1.97 | 1.00 | 17.25 | 13.75 |
| Blocher, D. & Co., Baltimore, Md. | | 10.63 | 9.00 | 10.25 | 8.00 | 8.00 | 8.00 | 1.97 | 1.00 | 1.97 | 1.00 | 17.25 | 13.75 |
| Bowker Fertilizer Co., Boston, Mass. | | 15.52 | 13.00 | 12.16 | 11.00 | 11.00 | 11.00 | 1.97 | 1.00 | 1.97 | 1.00 | 14.75 | 13.25 |
| Bowker Fertilizer Co., Boston, Mass. | | 14.72 | 12.00 | 10.82 | 10.00 | 10.00 | 10.00 | 1.97 | 1.00 | 1.97 | 1.00 | 16.50 | 13.75 |
| Bowker Fertilizer Co., Boston, Mass. | | 22.91 | 18.00 | 10.57 | 8.00 | 8.00 | 8.00 | 2.56 | 1.00 | 2.56 | 1.00 | 23.75 | 19.75 |
| Bowker Fertilizer Co., Boston, Mass. | | 13.37 | 10.00 | 10.57 | 8.00 | 8.00 | 8.00 | 1.96 | 1.00 | 1.96 | 1.00 | 21.75 | 16.00 |
| Bowker Fertilizer Co., Boston, Mass. | | 11.90 | 12.00 | 10.95 | 10.00 | 10.00 | 10.00 | 1.96 | 1.00 | 1.96 | 1.00 | 17.00 | 13.75 |
| Bradley Fertilizer Co., Boston, Mass. | | 12.02 | 14.00 | 11.71 | 10.00 | 10.00 | 10.00 | 2.31 | 1.65 | 2.31 | 1.65 | 21.50 | 17.25 |
| Bradley Fertilizer Co., Boston, Mass. | | 12.77 | 12.00 | 10.75 | 10.00 | 10.00 | 10.00 | 2.36 | 1.56 | 2.36 | 1.56 | 23.25 | 19.25 |
| Bradley Fertilizer Co., Boston, Mass. | | 12.31 | 10.00 | 10.81 | 8.00 | 8.00 | 8.00 | 2.44 | 2.06 | 2.44 | 2.06 | 28.50 | 23.25 |

TABLE I.—Continued.

| NAME AND ADDRESS OF MANUFACTURER. | NAME OF BRAND. | Total Phosphoric Acid in Official Sample. | Total Phosphoric Acid Guaranteed. | Total Phosphoric Acid in Inspector's Sample. | Available Phosphoric Acid in Official Sample. | Available Phosphoric Acid Guaranteed. | Available Phosphoric Acid in Inspector's Sample. | Nitrogen in Official Sample. | Nitrogen Guaranteed. | Nitrogen in Inspector's Sample. | Potash in Official Sample. | Potash Guaranteed. | Potash in Inspector's Sample. | Valuation of Official Analysis. | Valuation calculated from Guaranteed Analysis. | Valuation of Inspector's Sample. | Official Sample Above Guarantee. | Inspector's Sample Above |
|---------------------------------------|--------------------------------|---|-----------------------------------|--|---|---------------------------------------|--|------------------------------|----------------------|---------------------------------|----------------------------|--------------------|-------------------------------|---------------------------------|--|----------------------------------|----------------------------------|--------------------------|
| | | antec. | antec. | antec. | antec. | antec. | antec. | antec. | antec. | antec. | antec. | antec. | antec. | antec. | antec. | antec. | antec. | antec. |
| Bradley Fertilizer Co., Boston, Mass. | Dissolved Bone with Potash. | 10.98 | 10.00 | 8.17 | 8.45 | 8.00 | 6.25 | 1.27 | .82 | 1.32 | 2.53 | 2.15 | 2.54 | 21.35 | 18.00 | 19.50 | 3.35 | 1.50 |
| Bradley Fertilizer Co., Boston, Mass. | Dissolved Bone, Justice Brand | 14.42 | 13.00 | 13.87 | 13.33 | 12.00 | 9.11 | 1.38 | .82 | 1.18 | 3.81 | 2.00 | 2.39 | 14.75 | 13.50 | 14.00 | 1.25 | .50 |
| Bradley Fertilizer Co., Boston, Mass. | Fine Ground Bone. | 22.45 | 21.00 | ... | ... | ... | ... | 3.08 | 2.50 | ... | ... | ... | ... | 25.50 | 24.50 | ... | 1.00 | ... |
| Bradley Fertilizer Co., Boston, Mass. | Niagara Phosphate. | 10.42 | 8.00 | 10.17 | 8.96 | 7.00 | 8.20 | 1.14 | .82 | 1.03 | 2.35 | 1.08 | 1.85 | 20.00 | 15.00 | 19.25 | 5.00 | 4.25 |
| Chem. Co. of Canton, Baltimore, Md | Baker's Spec. | 12.11 | 10.00 | 10.65 | 10.35 | 9.00 | 8.91 | 1.38 | .82 | 1.18 | 3.81 | 2.00 | 2.39 | 25.00 | 18.00 | 20.75 | 7.00 | 2.75 |
| Chem. Co. of Canton, Baltimore, Md | Dissolved Animal Bone & Potash | 10.45 | 9.00 | ... | 8.63 | 8.00 | ... | 1.46 | .82 | ... | 5.05 | 4.50 | ... | 25.75 | 20.75 | ... | 5.00 | ... |
| Chem. Co. of Canton, Baltimore, Md | Pure Dissolved S. C. Bone | 17.66 | 15.00 | 15.34 | 15.20 | 14.00 | 13.99 | ... | ... | ... | ... | ... | ... | 17.00 | 15.25 | 15.50 | 1.75 | .25 |
| Chem. Co. of Canton, Baltimore, Md | Soluble Bone and Potash | 12.64 | 11.00 | 10.81 | 10.94 | 10.00 | 9.19 | ... | ... | ... | 3.53 | 2.00 | 2.51 | 18.00 | 14.75 | 14.25 | 3.25 | .50 |
| Cleveland Dryer Co., Cleveland, O. | Buckeye Ammo. Bone Su'phos | 13.42 | 11.00 | ... | 9.98 | 9.00 | ... | 2.96 | 2.47 | ... | 1.00 | 1.00 | ... | 29.50 | 25.50 | ... | 4.00 | ... |
| Cleveland Dryer Co., Cleveland, O. | Horseshod Phosphate. | 11.94 | 11.00 | ... | 11.12 | 9.00 | ... | 1.83 | 1.23 | ... | ... | ... | ... | 12.75 | 11.50 | ... | 1.25 | ... |
| Cleveland Dryer Co., Cleveland, O. | Ohio Seed Maker. | 11.01 | 15.00 | ... | 10.52 | 10.00 | ... | ... | ... | ... | ... | ... | ... | 22.75 | 20.00 | ... | 2.75 | ... |
| Cleveland Dryer Co., Cleveland, O. | Ohio Seed Maker with Potash | 11.27 | 15.00 | ... | 10.44 | 10.00 | ... | 1.69 | 1.33 | ... | 1.89 | 2.00 | ... | 24.75 | 23.00 | ... | 1.75 | ... |
| Cleveland Dryer Co., Cleveland, O. | Phospho Bone. | 11.69 | 10.00 | ... | 10.12 | 10.00 | ... | 1.12 | .63 | ... | 1.61 | 1.00 | ... | 20.25 | 16.00 | ... | 4.25 | ... |
| Cleveland Dryer Co., Cleveland, O. | Potato and Vegetable Fer. | 12.50 | 10.00 | ... | 10.30 | 8.00 | ... | 3.54 | 3.29 | ... | 1.37 | 1.00 | ... | 30.75 | 33.00 | ... | 3.75 | ... |
| Cleveland Dryer Co., Cleveland, O. | Square Bone | 22.22 | 20.00 | ... | 9.29 | 6.00 | ... | 2.73 | 2.05 | ... | ... | ... | ... | 30.75 | 22.50 | ... | 8.25 | ... |
| Cleveland Dryer Co., Cleveland, O. | Superior Bone Meal. | 21.97 | 22.00 | ... | ... | ... | ... | 4.06 | 3.29 | ... | ... | ... | ... | 32.50 | 28.00 | ... | 4.50 | ... |
| Cleveland Dryer Co., Cleveland, O. | XXX Phosphate | 15.52 | 15.00 | ... | 13.01 | 13.00 | ... | ... | ... | ... | ... | ... | ... | 15.25 | 15.00 | ... | .25 | ... |
| Crocker Fer. & Chem. Co., Buffalo. | Bone Meal | 29.87 | 25.00 | ... | ... | ... | ... | 2.33 | 2.00 | ... | ... | ... | ... | 29.75 | 25.25 | ... | 4.50 | ... |
| Crocker Fer. & Chem. Co., Buffalo. | Brown's Wheat and Corn | 10.22 | 9.00 | ... | 9.63 | 8.00 | ... | 2.10 | 1.64 | ... | 2.37 | 1.62 | ... | 25.00 | 20.75 | ... | 4.25 | ... |
| Crocker Fer. & Chem. Co., Buffalo. | General Crop Phosphate. | 8.10 | 8.00 | 9.24 | 7.47 | 7.00 | 7.03 | 1.10 | .82 | 1.06 | 1.45 | 1.08 | 1.33 | 17.25 | 15.00 | 17.25 | 2.25 | ... |
| Crocker Fer. & Chem. Co., Buffalo. | New Rival Ammo. Superphos. | 11.24 | 11.00 | 10.24 | 10.24 | 10.00 | ... | 1.34 | 1.20 | ... | 2.00 | 1.60 | ... | 21.75 | 20.25 | ... | 1.50 | ... |
| Crocker Fer. & Chem. Co., Buffalo. | Niagara Phosphate | 15.69 | 12.00 | 12.73 | 13.56 | 11.50 | 11.45 | ... | ... | ... | ... | ... | ... | 15.50 | 12.75 | 13.25 | 2.75 | .50 |

TABLE I.—Continued.

| NAME AND ADDRESS OF MANUFACTURER. | NAME OF BRAND. | ANALYSIS | | | | | | | | | | | | | | Inspector's Sample Above Guarantee. | Inspector's Sample Above Guarantee. |
|---|--------------------------------|---|-----------------------------------|--|---|--|---------------------------------------|---|------------------------------|---------------------------------|----------------------------|-------------------------------|---------------------------------|----------------------------------|-------|-------------------------------------|-------------------------------------|
| | | Total Phosphoric Acid in Official Sample. | Total Phosphoric Acid Guaranteed. | Total Phosphoric Acid in Inspector's Sample. | Available Phosphoric Acid in Official Sample. | Available Phosphoric Acid in Inspector's Sample. | Available Phosphoric Acid Guaranteed. | Available Phosphoric Acid in Official Sample. | Nitrogen in Official Sample. | Nitrogen in Inspector's Sample. | Potash in Official Sample. | Potash in Inspector's Sample. | Valuation of Official Analysis. | Valuation of Inspector's Sample. | | | |
| Crocker Fer. & Chem. Co., Buffalo .. | Potato Hop and Tobacco Phos | 11.26 | 11.00 | 12.51 | 10.66 | 10.00 | 10.00 | 10.00 | 2.30 | 2.00 | 2.57 | 3.00 | 25.50 | 26.75 | 31.00 | 2.75 | |
| Crocker Fer. & Chem. Co., Buffalo .. | Special Potato Manure | 9.34 | 9.00 | ..... | 8.73 | 8.00 | ..... | ..... | 3.86 | 3.70 | 5.05 | 5.40 | 38.50 | 38.50 | ..... | 2.00 | |
| Crocker Fer. & Chem. Co., Buffalo .. | Universal Grain Grower | 7.40 | 8.00 | 10.13 | 7.03 | 7.00 | 7.57 | 7.57 | 1.03 | .82 | 1.13 | 1.00 | 18.00 | 18.00 | 21.75 | 5.00 | |
| Crocker Fer. & Chem. Co., Buffalo .. | Wheat and Corn Phosphate | 11.61 | 11.00 | ..... | 10.36 | 10.00 | ..... | ..... | 2.16 | 2.00 | 2.17 | 1.60 | 26.25 | 26.25 | ..... | 2.00 | |
| Detrick Fer. & Chem. Co., Baltimore .. | Ammoniated Bone Phosphate | 11.56 | 11.00 | ..... | 9.50 | 9.00 | ..... | ..... | 1.30 | 1.25 | 1.31 | 1.00 | 20.50 | 19.25 | ..... | 1.25 | |
| Detrick Fer. & Chem. Co., Baltimore .. | Corn Fertilizer | 13.13 | 11.00 | ..... | 10.53 | 10.00 | ..... | ..... | 1.13 | .82 | 2.28 | 2.00 | 22.00 | 19.00 | ..... | 3.00 | |
| Detrick Fer. & Chem. Co., Baltimore .. | Dissolved S. C. Bone | 16.58 | 15.00 | 15.63 | 15.40 | 11.00 | 14.91 | 14.91 | ..... | ..... | ..... | ..... | 16.50 | 15.25 | 15.75 | 1.25 | |
| Detrick Fer. & Chem. Co., Baltimore .. | Imperial Compound | 11.75 | 10.50 | ..... | 9.70 | 9.00 | ..... | ..... | .88 | .82 | 1.27 | 1.00 | 18.50 | 16.75 | ..... | 1.75 | |
| Detrick Fer. & Chem. Co., Baltimore .. | Potato Fertilizer | 12.12 | 9.50 | ..... | 10.01 | 9.00 | ..... | ..... | 2.14 | 2.06 | 1.30 | 1.00 | 20.50 | 20.50 | ..... | 3.00 | |
| Detrick Fer. & Chem. Co., Baltimore .. | Pure Fine Ground Animal Bone | 19.34 | 21.50 | ..... | ..... | ..... | ..... | ..... | 5.74 | 3.26 | ..... | ..... | 35.25 | 32.75 | ..... | 7.50 | |
| Detrick Fer. & Chem. Co., Baltimore .. | Soluble Bone Phos. and Potash | 11.68 | 12.00 | ..... | 10.51 | 10.00 | ..... | ..... | ..... | ..... | 1.80 | 2.00 | 15.00 | 15.25 | ..... | 2.25 | |
| Detrick Fer. & Chem. Co., Baltimore .. | Vegetator Ammo. Superphos. | 13.56 | 12.00 | 13.14 | 11.17 | 10.00 | 10.12 | 10.00 | 2.07 | 2.06 | 1.94 | 1.81 | 1.52 | 26.50 | 25.00 | 1.50 | |
| Detrick Fer. & Chem. Co., Baltimore .. | Wheat Fertilizer | 13.73 | 12.00 | ..... | 12.27 | 10.00 | ..... | ..... | 0.99 | 1.03 | ..... | ..... | 25.25 | 17.50 | ..... | 7.75 | |
| Detrick, Louis F., Baltimore, Md. | Bone and Potash Mixture | 13.58 | 12.50 | ..... | 11.08 | 10.00 | ..... | ..... | ..... | ..... | 2.70 | 2.25 | 17.50 | 15.75 | ..... | 1.75 | |
| Detrick, Louis F., Baltimore, Md. | Kangaroo Compound (K.K.K.) | 13.17 | 11.50 | ..... | 10.67 | 8.00 | ..... | ..... | 1.78 | 1.05 | 3.30 | 3.00 | 26.75 | 24.00 | ..... | 2.75 | |
| Detrick, Louis F., Baltimore, Md. | Orechilla Guano | 16.21 | 11.00 | ..... | 5.48 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 12.75 | 11.00 | ..... | 1.75 | |
| Detrick, Louis F., Baltimore, Md. | Rockless and Shoeless | 12.79 | 10.00 | ..... | 9.79 | 8.00 | ..... | ..... | 1.17 | 1.03 | 1.45 | 1.25 | 20.50 | 17.75 | ..... | 2.75 | |
| Detrick, Louis F., Baltimore, Md. | XXtra Acid Phosphate | 16.49 | 15.00 | ..... | 15.31 | 14.00 | ..... | ..... | ..... | ..... | ..... | ..... | 16.50 | 15.25 | ..... | 1.25 | |
| Eureka Fertilizer Co., Perryville, Md. | King's S. C. Bone | 17.75 | 16.00 | ..... | 11.92 | 11.00 | ..... | ..... | ..... | ..... | ..... | ..... | 17.00 | 15.75 | ..... | 1.25 | |
| Gilpin, R. K. & Co., Wheeling, W. Va. | Daisy Fertilizer | 9.73 | 8.00 | 11.71 | 3.12 | 3.00 | 7.09 | 3.05 | 1.00 | 5.83 | .63 | 2.00 | .17 | 25.00 | 31.75 | 6.00—7.5 | |

TABLE I.—Continued.

| NAME AND ADDRESS OF MANUFACTURER. | NAME OF BRAND. | Total Phosphoric Acid in Official Sample. | Total Phosphoric Acid Guaranteed. | Total Phosphoric Acid in Inspector's Sample. | Available Phosphoric Acid in Official Sample. | Available Phosphoric Acid Guaranteed. | Available Phosphoric Acid in Inspector's Sample. | Nitrogen in Official Sample. | Nitrogen Guaranteed. | Nitrogen in Inspector's Sample. | Potash in Official Sample. | Potash Guaranteed. | Potash in Inspector's Sample. | Valuation of Official Analysis. | Valuation Calculated from Guaranteed Analysis. | Valuation of Inspector's Sample. | Official Sample Above Guarantee. | Inspector's Sample Above Guarantee. |
|--------------------------------------|-------------------------------|---|-----------------------------------|--|---|---------------------------------------|--|------------------------------|----------------------|---------------------------------|----------------------------|--------------------|-------------------------------|---------------------------------|--|----------------------------------|----------------------------------|-------------------------------------|
| Maryland Fer. & Mfg Co., Baltimore | Globe Complete Manure | 11.81 | 10.00 | 11.74 | 8.51 | 9.00 | 8.72 | 1.84 | 1.05 | 1.81 | 2.57 | 1.50 | 1.97 | 24.75 | 21.50 | 23.25 | 3.25 | 2.75 |
| Maryland Fer. & Mfg Co., Baltimore | Linden Superphosphate | 12.88 | 12.00 | 12.70 | 9.80 | 11.00 | 11.97 | .56 | .41 | 1.97 | 2.56 | 2.56 | 2.14 | 16.50 | 16.25 | 17.75 | .25 | 1.50 |
| Maryland Fer. & Mfg Co., Baltimore | Tornado Fertilizer | 12.87 | 12.00 | | 12.61 | 11.00 | | | | | 3.47 | 3.25 | | 21.50 | 19.50 | | 2.00 | |
| Northwestern Fer. Co., Chicago, Ill. | Acidulated Bone | 11.75 | 11.00 | 10.51 | 10.00 | | | 1.19 | 1.00 | | | | | 18.50 | 17.00 | | 1.50 | |
| Northwestern Fer. Co., Chicago, Ill. | Dissolved Bone Phosphate | 13.50 | 12.00 | | 12.67 | 11.00 | | 1.29 | 1.23 | | | | | 20.50 | 19.00 | | 1.50 | |
| Northwestern Fer. Co., Chicago, Ill. | Fine Raw Bone | 13.10 | 12.20 | | 9.93 | 8.90 | | 3.93 | 3.29 | | | | | 31.25 | 28.00 | | 3.25 | |
| Northwestern Fer. Co., Chicago, Ill. | Garden City Superphosphate | 11.38 | 12.00 | 10.62 | 7.95 | 8.00 | 8.85 | 2.51 | 2.05 | 2.13 | 1.25 | .54 | 2.31 | 25.75 | 22.75 | 25.50 | 3.00 | 2.75 |
| Northwestern Fer. Co., Chicago, Ill. | Potato Grower | 9.65 | 12.00 | | 9.10 | 8.00 | | 3.13 | 2.50 | | | | | 29.75 | 27.75 | | 2.00 | |
| Northwestern Fer. Co., Chicago, Ill. | Prairie Phosphate | 11.02 | 8.00 | | 9.60 | 6.00 | | 2.62 | 1.65 | | | | | 25.00 | 17.25 | | 7.75 | |
| Ober, G. & Sons, Baltimore, Md. | Dissolved Bone Phosphate | 17.55 | 16.00 | 16.76 | 16.36 | 14.00 | 16.29 | | | | | | | 17.25 | 15.75 | 17.00 | 1.50 | 1.25 |
| Ober, G. & Sons, Baltimore, Md. | Farmer's Standard Ammo. Phos | 11.03 | 10.00 | 11.06 | 10.36 | 8.00 | 9.97 | 2.26 | 1.75 | 2.24 | 2.50 | 1.50 | 2.55 | 27.25 | 26.75 | 25.75 | 2.50 | 5.00 |
| Ober, G. & Sons, Baltimore, Md. | Special Ammoniated Dis. Bone | 12.51 | 10.00 | | 10.91 | 8.00 | | 1.53 | 1.25 | | 3.19 | 2.00 | | 25.25 | 19.75 | | 5.50 | |
| Ober, G. & Sons, Baltimore, Md. | Special Mixture for Wheat | 12.84 | 10.00 | 12.87 | 11.45 | 8.00 | 11.95 | 1.37 | 1.44 | 1.44 | 2.43 | 1.50 | 2.70 | 23.75 | 17.00 | 24.75 | 6.75 | 7.75 |
| Ober, G. & Sons, Baltimore, Md. | Shenandoah Bone Phosphate | 11.09 | 11.00 | | 10.26 | 8.00 | | 2.00 | 1.65 | | 3.12 | 2.00 | | 26.50 | 22.25 | | 4.25 | |
| Ober, G. & Sons, Baltimore, Md. | Dissolved Bone Phos. and Pot. | 13.29 | 13.00 | 14.29 | 12.23 | 11.00 | 13.45 | | | | 2.42 | 2.00 | 2.90 | 17.25 | 16.00 | 19.00 | 1.25 | 3.50 |
| Ober, G. & Sons, Baltimore, Md. | S. & S. Special Wheat Com'd | 11.74 | 10.00 | 11.17 | 9.35 | 8.50 | 9.34 | 2.10 | 1.40 | 2.00 | 2.77 | 2.00 | 3.09 | 26.50 | 20.75 | 26.25 | 5.75 | 5.50 |
| Old Dominion Guano Co., Norfolk, Va. | Alkaline Bone and Potash | 12.91 | 10.00 | | 11.58 | 10.00 | | | | | 2.33 | 2.00 | | 16.75 | 14.25 | | 2.50 | |
| Old Dominion Guano Co., Norfolk, Va. | High Grade Bone Superphos. | 15.65 | 13.00 | | 15.34 | 13.00 | | | | | | | | 16.00 | 14.00 | | 2.00 | |
| Old Dominion Guano Co., Norfolk, Va. | Royster's High Grade A'd Phos | 15.32 | 12.00 | | 15.32 | 12.00 | | | | | | | | 16.00 | 13.00 | | 3.00 | |
| Old Dominion Guano Co., Norfolk, Va. | Special Wheat Guano | 10.99 | 8.00 | | 9.44 | 8.00 | | 2.33 | 1.65 | | 2.48 | 2.00 | | 26.50 | 21.00 | | 5.50 | |
| Old Dominion Guano Co., Norfolk, Va. | Dissolved Bone and Potash | 13.45 | 10.00 | | 12.51 | 10.00 | | | | | 2.85 | 1.00 | | 18.00 | 12.75 | | 5.25 | |
| Pacific Guano Co., New York, N. Y. | A No. 1 Phosphate | 9.71 | 8.00 | | 7.93 | 7.00 | | 1.05 | 1.06 | | 2.00 | 1.50 | | 18.75 | 17.00 | | 1.75 | |

TABLE I.—Continued.

| NAME AND ADDRESS OF MANUFACTURER. | NAME OF BRAND. | Total Phosphoric Acid in Official Sample. | Total Phosphoric Acid in Inspector's Sample. | Available Phosphoric Acid in Official Sample. | Available Phosphoric Acid Guaranteed. | Available Phosphoric Acid in Inspector's Sample. | Nitrogen in Official Sample. | Nitrogen Guaranteed. | Nitrogen in Inspector's Sample. | Potash in Official Sample. | Potash Guaranteed. | Potash in Inspector's Sample. | Valuation of Official Analysis. | Valuation calculated from Guaranteed Analysis. | Valuation of Inspector's Sample. | Official Sample Above Guarantee. | Inspector's Sample Above Guarantee. |
|--|-------------------------------|---|--|---|---------------------------------------|--|------------------------------|----------------------|---------------------------------|----------------------------|--------------------|-------------------------------|---------------------------------|--|----------------------------------|----------------------------------|-------------------------------------|
| Pacific Guano Co., New York, N. Y. | Dissolved Bone Phos. of Lime | 16.03 | 14.10 | 15.07 | 13.00 | ... | ... | ... | ... | ... | ... | ... | 16.00 | 14.50 | ... | 1.50 | ... |
| Pacific Guano Co., New York, N. Y. | Fine Ground Bone | 17.10 | 20.00 | ... | ... | ... | 4.41 | 1.45 | ... | ... | ... | ... | 22.00 | 21.00 | ... | 1.00 | ... |
| Pacific Guano Co., New York, N. Y. | Nobsque Guano | 11.09 | 9.00 | 9.09 | 8.00 | ... | 1.38 | 1.15 | ... | 2.42 | 2.00 | ... | 20.75 | 19.00 | ... | 1.75 | ... |
| Pacific Guano Co., New York, N. Y. | Potato Phosphate | 9.08 | 7.00 | 7.31 | 6.00 | ... | 1.62 | 1.53 | ... | 6.29 | 5.00 | ... | 27.25 | 23.00 | ... | 5.25 | ... |
| Pacific Guano Co., New York, N. Y. | Dissolved Bone and Potash | 12.80 | 10.00 | 11.01 | 10.00 | ... | ... | ... | ... | 2.41 | 2.00 | ... | 16.50 | 14.25 | ... | 2.25 | ... |
| Piedmont Mt. Airy Guano Co., Balto Dis'nd Bone Phos. Pot - Goods | ... | 11.32 | 10.50 | 12.63 | 10.32 | 10.50 | 10.98 | ... | 1.20 | 1.00 | 1.31 | 14.00 | 13.25 | 15.00 | ... | .75 | 1.75 |
| Piedmont Mt. Airy Guano Co., Balto High Grade S. C. Bone | ... | 15.45 | 16.00 | 17.74 | 14.70 | 14.00 | 17.39 | ... | ... | ... | ... | ... | 15.75 | 15.75 | 17.75 | ... | 2.00 |
| Piedmont Mt. Airy Guano Co., Balto Piedmont Potato Pro'er (P. P. P.) | ... | 6.41 | 5.00 | 5.78 | 5.00 | ... | 2.46 | 2.50 | ... | 6.97 | 6.00 | ... | 30.50 | 28.50 | ... | 2.00 | ... |
| Piedmont Mt. Airy Guano Co., Balto Pure Raw Bone Mixture | ... | 10.41 | 7.00 | 11.63 | 7.74 | 7.00 | 8.46 | 1.26 | .81 | 1.09 | 1.15 | 1.61 | 19.00 | 14.50 | 19.50 | 1.50 | 5.00 |
| Piedmont Mt. Airy Guano Co., Balto Royal Ammo. Bone and Potash | ... | 6.41 | 6.00 | 6.82 | 5.34 | 6.00 | 5.08 | 1.06 | 1.08 | 1.16 | 3.55 | 3.32 | 18.50 | 17.75 | 19.00 | .75 | 1.25 |
| Powell Fer. & Chem. Co., Baltimore | Bone and Potash Fertilizer | 11.60 | 12.00 | ... | 10.91 | 10.00 | ... | ... | ... | 2.79 | 2.00 | ... | 16.50 | 15.25 | ... | 1.25 | ... |
| Powell Fer. & Chem. Co., Baltimore | Dissolved Soluble Bone Phos. | 16.38 | 16.00 | ... | 15.97 | 14.00 | ... | ... | ... | ... | ... | ... | 16.50 | 15.75 | ... | .75 | ... |
| Powell Fer. & Chem. Co., Baltimore | Red Bag Fertilizer | 11.03 | 10.00 | ... | 9.42 | 8.00 | 1.04 | 1.25 | ... | 1.55 | 1.00 | ... | 19.25 | 18.50 | ... | .75 | ... |
| Ramsburg Fer. Co., Frederick, Md. | Dissolved Bone Superphos. | 16.77 | 14.00 | 14.67 | 14.00 | ... | ... | ... | ... | ... | ... | ... | 16.25 | 11.75 | ... | 1.50 | ... |
| Ramsburg Fer. Co., Frederick, Md. | Excelsior Plant Food | 15.84 | 14.00 | 11.13 | 10.00 | ... | 2.16 | 2.00 | ... | 1.54 | 1.00 | ... | 27.75 | 24.75 | ... | 3.00 | ... |
| Rasin Fertilizer Co., Baltimore, Md | Acid Phosphate | 16.35 | 15.00 | 15.57 | 15.25 | 14.00 | 15.04 | ... | ... | ... | ... | ... | 16.25 | 15.25 | 16.00 | 1.00 | .75 |
| Rasin Fertilizer Co., Baltimore, Md | Ammoniated Superphos. | 13.00 | 9.00 | 13.94 | 11.01 | 8.00 | 11.85 | 1.18 | 1.00 | 1.12 | 2.00 | ... | 22.00 | 16.75 | 21.50 | 5.25 | 4.75 |
| Rasin Fertilizer Co., Baltimore, Md | Bone and Potash | 17.22 | 13.00 | 14.13 | 13.74 | 12.00 | 12.49 | ... | ... | 1.07 | 1.25 | 1.43 | 17.75 | 15.25 | 19.00 | 2.50 | .75 |
| Rasin Fertilizer Co., Baltimore, Md | Dissolved Bones | 13.45 | 12.00 | ... | 10.33 | 10.00 | 2.06 | 2.00 | ... | ... | ... | ... | 23.75 | 22.50 | ... | 1.25 | ... |
| Rasin Fertilizer Co., Baltimore, Md | Empire Guano | 11.71 | 9.00 | 11.74 | 8.49 | 8.00 | 8.94 | 2.13 | 2.00 | 2.43 | 2.85 | 1.50 | 26.50 | 22.50 | 27.00 | 4.00 | 4.50 |
| Rasin Fertilizer Co., Baltimore, Md | Ground Bones | 21.08 | 20.00 | 21.20 | ... | ... | 3.92 | 3.30 | ... | ... | ... | ... | 20.75 | 27.00 | 30.50 | 2.75 | 3.50 |
| Rasin Fertilizer Co., Baltimore, Md | Walker's Dissolved S. C. Bone | 16.40 | 15.00 | 15.25 | 14.00 | ... | ... | ... | ... | ... | ... | ... | 16.25 | 15.25 | ... | 1.00 | ... |

TABLE I.—Continued.

| NAME AND ADDRESS OF MANUFACTURER. | NAME OF BRAND. | ANALYSIS | | | | | | | | | | | | Inspector's Sample Above Guarantee. | Inspector's Sample Above Guarantee. |
|---------------------------------------|------------------------------|---|-----------------------------------|--|------------------------------|----------------------|---------------------------------|----------------------------|--------------------|---------------------------------|--|----------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| | | Total Phosphoric Acid in Official Sample. | Total Phosphoric Acid Guaranteed. | Available Phosphoric Acid in Inspector's Sample. | Nitrogen in Official Sample. | Nitrogen Guaranteed. | Nitrogen in Inspector's Sample. | Potash in Official Sample. | Potash Guaranteed. | Valuation of Official Analysis. | Valuation Calculated from Guaranteed Analysis. | Valuation of Inspector's Sample. | Inspector's Sample Above Guarantee. | | |
| Reese, John S. & Co., Baltimore, Md. | Edna Phosphate | 15.71 16.00 | 15.06 14.00 | 1.00 | 2.29 | 2.00 | 1.00 | 1.15 | 1.00 | 16.00 | 15.75 | 16.00 | 1.25 | ..... | ..... |
| Reese, John S. & Co., Baltimore, Md. | Half and Half | 12.18 9.00 | 11.17 8.00 | ..... | ..... | ..... | ..... | ..... | ..... | 20.50 | 15.75 | ..... | 1.25 | ..... | ..... |
| Robinson, Isaac, Baltimore, Md. | High Grade Soluble Phosphate | 16.74 14.00 | 14.88 11.00 | ..... | ..... | ..... | ..... | ..... | ..... | 16.50 | 14.25 | ..... | 2.25 | ..... | ..... |
| Robinson, Isaac, Baltimore, Md. | Potashed Bone | 12.00 10.00 | 9.75 10.00 | ..... | ..... | ..... | ..... | 2.09 | 2.00 | 16.25 | 14.25 | ..... | 2.00 | ..... | ..... |
| Robinson, Isaac, Baltimore, Md. | Cyclone Phosphate | 11.40 10.00 | 12.66 10.00 | ..... | ..... | ..... | ..... | ..... | ..... | 11.50 | 11.50 | ..... | 3.00 | ..... | ..... |
| Samson Fertilizer Co., Northeast, Pa. | High Grade Fish Guano | 11.92 12.00 | 10.12 10.00 | ..... | ..... | ..... | ..... | 2.62 | 2.00 | 27.75 | 25.25 | ..... | 2.50 | ..... | ..... |
| Slingluff & Co., Baltimore, Md. | Alkaline Superphosphate | 14.99 11.00 | 11.42 11.00 | 10.97 | ..... | ..... | ..... | 2.87 | 2.00 | 19.50 | 11.75 | 16.25 | 4.75 | 1.50 | ..... |
| Slingluff & Co., Baltimore, Md. | Dissolved South Carolina | 16.12 11.00 | 15.78 15.49 | 15.11 | ..... | ..... | ..... | ..... | ..... | 16.25 | 14.75 | 16.00 | 1.50 | 1.50 | ..... |
| Slingluff & Co., Baltimore, Md. | Special Bone Phosphate | 15.18 13.00 | 14.73 13.96 | 13.28 | 1.20 | ..... | ..... | ..... | ..... | 21.25 | 17.75 | 20.00 | 3.70 | 2.25 | ..... |
| Slingluff & Co., Baltimore, Md. | Universal Guano | 11.52 10.00 | 13.26 9.00 | 11.27 | 1.20 | ..... | ..... | 2.29 | 2.00 | 24.00 | 18.00 | 22.50 | 6.00 | 4.50 | ..... |
| Susquehanna Fertilizer Co., Balto. | Dissolved S. C. Bone | 11.83 15.00 | 11.00 14.00 | 8.08 | 1.45 | 1.00 | 1.00 | 2.28 | 2.00 | 15.25 | 15.25 | ..... | ..... | ..... | ..... |
| Susquehanna Fertilizer Co., Balto. | XXV Phosphate | 9.42 10.00 | 8.32 8.00 | 8.41 | 2.06 | 1.65 | 1.65 | 2.07 | 2.00 | 21.25 | 17.25 | 19.75 | 4.00 | 2.50 | ..... |
| Travers, S. W. & Co., Richmond, Va. | Beef Blood and Bone Fer | 10.54 9.00 | 8.86 8.00 | 8.41 | 2.06 | 1.65 | 1.65 | 2.07 | 2.00 | 24.75 | 20.00 | 24.50 | 1.75 | 1.50 | ..... |
| Travers, S. W. & Co., Richmond, Va. | Capital Dissolved S. C. Bone | 13.42 13.00 | 12.74 12.00 | 12.74 | ..... | ..... | ..... | ..... | ..... | 14.00 | 13.50 | ..... | ..... | ..... | ..... |
| Travers, S. W. & Co., Richmond, Va. | Champion Corn Grower | 10.29 9.00 | 9.36 8.00 | ..... | ..... | ..... | ..... | ..... | ..... | 20.00 | 17.25 | ..... | 2.75 | ..... | ..... |
| Travers, S. W. & Co., Richmond, Va. | Dissolved Bone Phosphate | 15.19 15.00 | 14.93 14.00 | ..... | ..... | ..... | ..... | 2.73 | 2.00 | 15.75 | 15.25 | ..... | ..... | ..... | ..... |
| Travers, S. W. & Co., Richmond, Va. | National Tobacco Fer | 11.62 9.50 | 9.95 8.50 | 9.24 | 1.87 | ..... | ..... | 3.08 | 2.25 | 28.00 | 23.25 | ..... | 4.75 | ..... | ..... |
| Tygert-Allen Fer. Co., Philadelphia. | High Grade S. C. Bone | 16.25 14.00 | 15.01 14.00 | ..... | ..... | ..... | ..... | ..... | ..... | 16.25 | 14.75 | ..... | 1.50 | ..... | ..... |
| Virginia Carolina Chem. Co., Richmond | Acid Phosphate | 17.14 15.00 | 14.65 14.00 | ..... | ..... | ..... | ..... | ..... | ..... | 16.50 | 15.25 | ..... | 1.25 | ..... | ..... |

TABLE 1.—Continued.

| NAME AND ADDRESS OF MANUFACTURER. | NAME OF BRAND. | ANALYSIS | | | | | | | | | | |
|--------------------------------------|------------------------------|---|---|---|---|------------------------------|--------------------------------|----------------------------|------------------------------|--|---------------------------------|-------------------------------------|
| | | Total Phosphoric Acid in Official Sample. | Total Phosphoric Acid in Inspectors Sample. | Available Phosphoric Acid in Official Sample. | Available Phosphoric Acid in Inspectors Sample. | Nitrogen in Official Sample. | Nitrogen in Inspectors Sample. | Potash in Official Sample. | Potash in Inspectors Sample. | Valuation calculated from Guaranteed Analysis. | Valuation of Inspectors Sample. | Inspector's Sample Above Guarantee. |
| Walker Stratman & Co., Pittsburgh | Bone and Meat. | 13.89 | 13.00 | 10.06 | 11.00 | 8.69 | 10.00 | 3.82 | 3.50 | 9.80 | 1.48 | 1.00 |
| Walker Stratman & Co., Pittsburgh | Four Fold. | 12.71 | 12.00 | 11.39 | 11.20 | 8.69 | 10.00 | 3.82 | 3.50 | 9.80 | 1.48 | 1.00 |
| Walker Stratman & Co., Pittsburgh | Help Mate. | 12.24 | 12.00 | 11.39 | 11.20 | 8.69 | 10.00 | 3.82 | 3.50 | 9.80 | 1.48 | 1.00 |
| Wheeling Butchers' Ass'n, Wheeling | Ohio Valley Bone Dust | 20.37 | 21.87 | 16.34 | 16.34 | 11.35 | 11.00 | 2.97 | 2.50 | 16.34 | 1.00 | 1.50 |
| Williams & Clark Fer. Co., New Y'k | Acorn Brand Acid Phos. | 15.71 | 14.00 | 17.83 | 15.01 | 13.00 | 16.63 | 2.08 | 1.65 | 16.63 | 1.00 | 1.50 |
| Williams & Clark Fer. Co., New Y'k | Americus Diss'd Bone and Pot | 12.71 | 10.00 | 12.73 | 10.85 | 10.00 | 10.34 | 2.08 | 1.65 | 10.34 | 1.00 | 1.50 |
| Williams & Clark Fer. Co., New Y'k | Carteret Ground Bone. | 17.91 | 17.00 | 20.63 | 19.63 | 16.63 | 16.63 | 2.08 | 1.65 | 16.63 | 1.00 | 1.50 |
| Williams & Clark Fer. Co., New Y'k | Good Grover Potato Phos. | 8.00 | 7.00 | 7.97 | 6.51 | 6.00 | 6.38 | 1.48 | 1.33 | 6.38 | 1.00 | 1.50 |
| Williams & Clark Fer. Co., New Y'k | Prolife Crop Producer. | 9.63 | 7.00 | 7.97 | 6.51 | 6.00 | 6.38 | 1.48 | 1.33 | 6.38 | 1.00 | 1.50 |
| Williams & Clark Fer. Co., New Y'k | Royal Bone Phosphate | 10.98 | 8.00 | 12.33 | 8.97 | 7.00 | 8.72 | 1.36 | 1.09 | 8.72 | 1.00 | 1.50 |
| Woodbridge, Rob't A., Co., Baltimore | Bone and Potash Mixture | 12.90 | 11.00 | 11.35 | 11.00 | 11.35 | 11.00 | 2.21 | 2.00 | 11.35 | 1.00 | 1.50 |
| Woodbridge, Rob't A., Co., Baltimore | Buffalo Pure Bone Phos. | 15.25 | 10.00 | 11.48 | 10.00 | 11.48 | 10.00 | 2.21 | 2.00 | 11.48 | 1.00 | 1.50 |
| Woodbridge, Rob't A., Co., Baltimore | Chieftain. | 12.00 | 9.00 | 9.35 | 9.00 | 9.35 | 9.00 | 1.93 | 1.50 | 9.35 | 1.00 | 1.50 |
| Woodbridge, Rob't A., Co., Baltimore | Little Giant. | 11.54 | 9.00 | 9.79 | 9.00 | 9.79 | 9.00 | 1.93 | 1.50 | 9.79 | 1.00 | 1.50 |
| Woodbridge, Rob't A., Co., Baltimore | Triumph | 10.04 | 8.00 | 8.01 | 8.00 | 8.01 | 8.00 | 1.47 | 1.33 | 8.01 | 1.00 | 1.50 |
| Woodbridge, Rob't A., Co., Baltimore | XXtra Acid phosphate | 15.92 | 14.00 | 14.37 | 14.00 | 14.37 | 14.00 | 2.21 | 2.00 | 14.37 | 1.00 | 1.50 |
| Zell Guano Co., Baltimore, Md. | Calvert Guano | 12.75 | 11.00 | 10.38 | 9.00 | 10.38 | 9.00 | 2.01 | 1.50 | 10.38 | 1.00 | 1.50 |
| Zell Guano Co., Baltimore, Md. | Dissolved Bone Phosphate | 16.08 | 15.00 | 15.41 | 14.45 | 13.00 | 13.50 | 2.01 | 1.50 | 13.50 | 1.00 | 1.50 |
| Zell Guano Co., Baltimore, Md. | Dissolved S. C. Phos. | 13.42 | 12.00 | 13.42 | 12.00 | 13.42 | 12.00 | 2.01 | 1.50 | 13.42 | 1.00 | 1.50 |
| Zell Guano Co., Baltimore, Md. | Economizer. | 12.73 | 11.00 | 13.51 | 11.45 | 9.00 | 10.95 | 1.10 | 1.19 | 10.95 | 1.00 | 1.50 |
| Zell Guano Co., Baltimore, Md. | Pure Ground Raw Bone | 22.76 | 20.00 | 18.83 | 18.83 | 18.83 | 18.83 | 4.38 | 3.30 | 18.83 | 1.00 | 1.50 |

AN ACT CONCERNING COMMERCIAL FERTILIZERS.

STATE OF WEST VIRGINIA.

CHAPTER LXXII.

AN ACT concerning Commercial Fertilizers and repealing chapter twenty-five of the acts of the Legislature of West Virginia of 1879.

[Passed March 6, 1891.]

Be it enacted by the Legislature of West Virginia :

1. Every person or company who shall sell, offer or expose for sale in this State, any commercial fertilizer or manure, shall affix conspicuously to every package thereof a plainly printed statement, clearly and truly certifying the number of net pounds of fertilizer in the package, the name, brand or trade-mark under which the fertilizer is sold, the name and address of the manufacturer, the place of manufacture, and a chemical analysis, stating the percentage of nitrogen or its equivalent in ammonia, of potash soluble in distilled water, and of phosphoric acid in available form, soluble in distilled water, and reverted, as well as the total phosphoric acid. In the case of those fertilizers which consist of other cheaper materials, said labels shall give a correct general statement of the composition and ingredients of the elements relied upon, contained in the fertilizer which it accompanies. If any such fertilizer be sold in bulk, such printed statement shall accompany and go with every lot and parcel sold, offered or exposed for sale.

2. Before any commercial fertilizer is sold, offered or exposed for sale in this State, the manufacturer, importer or party who causes it to be sold, exposed or offered for sale, shall file with the Director of the West Virginia Agricultural Experiment Station a certified copy of the statement named in section one of this Act, and shall also deposit with said Director, a sealed glass jar or bottle, or sealed tin can, containing not less than one pound of fertilizer named and described in said statement,

accompanied by an affidavit that it is a fair average sample therefore. The making of any affidavit required by this chapter falsely, shall be perjury.

3. The manufacturer, importer, agent or seller of any brand of commercial fertilizer or material used for manurial purposes, shall pay for each brand at the time he files the statement required in section one of this Act, an analysis fee of ten dollars for each of the fertilizing ingredients claimed to exist in each and every brand of fertilizer which he sells, offers or exposes for sale within this State, provided that whenever the manufacturer, or importer shall have paid the analysis fee herein required, for any particular brand of fertilizer, no agent or seller shall be required to pay any other or further analysis fee for said brand.

4. The analysis fee required to be paid by section three of this Act shall be paid to the Treasurer of the West Virginia University for the use of the Agricultural Experiment Station, and the party making such payments shall take from said Treasurer triplicate receipts therefor, one of which he shall retain, and the others shall be deposited, one with the Director of the Agricultural Experiment Station, and the other with the Secretary of the Board of Regents of the West Virginia University, and by them filed and preserved in their respective offices.

5. Immediately after the filing of the receipt aforesaid with the Director of the Agricultural Experiment Station, said Director shall issue a certificate to the party making such payment, stating the amount of fees paid, and the name, brand or trade-mark under which the fertilizer is sold, the name and address of the manufacturer or importer, the place of manufacture and the name and place of business of the dealer, and chemical analysis as set forth in the statement by section one of this Act, and that the applicant for said certificate is authorized to sell said fertilizer within the State of West Virginia for the period of one year from the first day of January to the 31st day of December, inclusive. Said certificates may be issued at any time for and during the current year, and may be issued dur-

ing the month of December for the year commencing on the first day of January thereafter.

6. It shall be the duty of the Director of the West Virginia Agricultural Experiment Station to make or cause to be made a chemical analysis of every sample of commercial fertilizer so furnished him, and he shall print the result of such analysis in the form of a label or tag. Such printed label or tag shall set forth the name of the manufacturer, the place of manufacture, the brand of the fertilizer, and the essential ingredients contained in said fertilizer, expressed in terms and manner approved by the Director, together with a certificate from the Director, setting forth that said analysis is a true and complete analysis of the sample furnished him of such brand of fertilizer of the ingredients claimed to be contained therein. And he shall also place upon each label or tag the money value per ton of such fertilizer, computed from its composition as he may determine. The Director shall furnish such labels or tags in quantities of one hundred or multiple thereof, to any person or company complying with this act, and desiring to sell, offer or expose for sale, any commercial fertilizer in this State, and shall receive therefor the sum of fifty cents for every one hundred so delivered, and shall without delay pay the same to the Treasurer of the West Virginia University for the use of the Agricultural Experiment Station, and take duplicate receipts therefor, one of which he shall retain and the other he shall deliver to the Secretary of the Board of Regents, who shall file and preserve the same in his office.

7. The Board of Regents of the West Virginia University shall expend the money received under the provisions of this Act in meeting the legitimate expenses of the Station, in making analyses of fertilizers, in experimental tests of same, and in such other experimental work and purchases as shall inure to the benefit of the farmers of this State, and shall include in their annual report a statement of the receipts and disbursements thereof.

8. The Director of the said Experiment Station is hereby authorized in person or by deputy to take samples for analysis

from any lot or from any commercial fertilizer which may be in the possession of any dealer in the State. And he is hereby authorized to prescribe and enforce such rules and regulations as he may deem necessary to carry fully into effect the true intent and meaning of this act; and any agriculturist, a purchaser of any commercial fertilizer in this State, may take a sample of the same under the rules and regulations of the Director of the said Experimental Station, or forward the same to the Experimental Station for analysis, and if the Director has reason to believe that the manufacturer of, or dealer in, said fertilizer has made any false or fraudulent representation in regard to said fertilizer, he shall cause the said sample to be analyzed free of charge, and certify the same to the person forwarding the sample.

9. Said Director shall also publish, by bulletin, the brand, name, and location of the manufacturer, and chemical analysis of every fertilizer analyzed or caused to be analyzed by him. Said last publication to be made, if practicable, before the time at which said fertilizer is to be applied to the soil.

Any manufacturer or vendor of any chemical fertilizer who shall sell, or offer or expose for sale, any commercial fertilizer without having previously complied with the provisions of this act herein before set forth, shall be deemed guilty of a misdemeanor, and upon conviction thereof, shall be fined not less than fifty nor more than five hundred dollars.

11. Any company, firm or person, who shall wilfully remove from or deface or change any label, or tag, or brand affixed to any package of fertilizer under the provisions of this act, before such fertilizer has been used for manurial purposes, or who shall sell such fertilizer without such label or tag being affixed thereto at the time of the sale, shall be deemed guilty of a misdemeanor, and upon conviction thereof, shall be fined not less than ten nor more than fifty dollars for each offense.

12. Any company, firm or person, who shall remove from or cause to be removed from any package of commercial fertilizer any statement, label or tag affixed thereto under the provisions

of this Act, and affix or cause the same to be affixed to any other package of commercial fertilizer shall be deemed guilty of a misdemeanor, and upon conviction thereof, shall be fined not less than ten nor more than fifty dollars for each offense.

13. Any company, firm or person violating any of the provisions of this Act, or who fails to comply with the requirements of this Act, shall be deemed guilty of a misdemeanor, and upon conviction thereof, shall, when no other penalty is prescribed, be fined not less than ten nor more than one hundred dollars for each offense. But this act shall not be construed to apply to any one who manufactures fertilizers for his own use and not for sale.

14. The Director of said Experiment Station shall report to the prosecuting attorney of the county wherein the offense was committed, all violations of the provisions of this act, and failure to comply therewith, and a copy of any statement, label or tag required to be filed with said Director, or prepared by him, and any analysis made or caused to be made by him, when duly certified by said Director, shall be received in evidence in any prosecution or a suit for any violation of the provision of this Act.

15. That chapter 25 of the Acts of the Legislature of West Virginia, passed on the 4th day of March, 1879, entitled "An act to protect the purchasers of fertilizers in this State," be and the same is hereby repealed.

